Claims:

1. A method for depositing a copper seed layer onto a substrate surface, wherein the substrate surface comprises a barrier layer, comprising:

placing the substrate surface into a copper solution, wherein the copper solution comprises complexed copper ions and a pH less than 7;

applying an electrical bias to the substrate surface; and

reducing the complexed copper ions with the bias to deposit the copper seed layer onto the barrier layer.

2. The method of claim 1, wherein the barrier layer is selected from the group consisting cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride and silver.

3. The method of claim 1, wherein the complexed copper ions are selected from the group consisting copper citrate, copper borate, copper tartrate, copper oxalate, copper pyrophosphate, copper acetate, copper EDTA complex and combinations thereof.

4. The method of claim 3, wherein the complexed copper ions have a concentration in a range from about 0.02 M to about 0.8 M.

5. The method of claim 4, wherein the bias is configured to generate a current density across the substrate surface that is less than about 10 mA/cm^2 across the substrate surface.

6. The method of claim 5, wherein the current density is in a range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

7. The method of claim 6, wherein the copper seed layer has a thickness less than about 200 Å.

8. The method of claim 7, further comprising depositing a gap-fill copper layer onto the copper seed layer and wherein, depositing the gap-fill layer comprises,

placing the substrate surface into a second copper solution, wherein the second copper solution includes free-copper ions;

applying a second electrical bias to the substrate surface; and

reducing the free-copper ions with the second electrical bias to deposit the copper gap-fill layer onto the copper seed layer.

9. The method of claim 8, further comprising depositing a bulk-fill copper layer onto the copper gap-fill layer, wherein depositing the bulk-fill layer comprises,

placing the substrate surface into a third copper solution, wherein third copper solution includes the free-copper ions;

applying a third electrical bias to the substrate surface; and

reducing the free-copper ions with the third electrical bias to deposit the copper bulk-fill layer onto the copper gap-fill layer.

10. The method of claim 9, wherein at least one leveling agent is added to the second copper solution to form the third copper solution.

11. A method for depositing a metal seed layer onto a barrier layer on a substrate surface, comprising:

placing the substrate surface into a solution, wherein the solution is acidic and comprises a metal source compound and a complexing compound;

forming complexed metal ions within the solution; and

reducing the complexed metal ions with an electroplating technique to form the metal seed layer.

12. The method of claim 11, wherein the metal seed layer comprise copper.

13. The method of claim 12, wherein the barrier layer is selected from the group consisting cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride and silver.

14. The method of claim 12, wherein the complexed metal ions are selected from the group consisting metal citrates, metal borates, metal tartrates, metal oxalates, metal pyrophosphates, metal acetates, metal EDTA complexes and combinations thereof.

15. The method of claim 14, wherein the metal source compound has a metal concentration in a range from about 0.02 M to about 0.8 M.

16. The method of claim 15, wherein the complexing compound has a concentration in a range from about 0.02 M to about 1.6 M.

17. The method of claim 14, wherein the electroplating technique comprises a bias configured to generate a current density that is less than about 10 mA/cm^2 across the substrate surface.

18. The method of claim 17, wherein the current density is in a range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

19. The method of claim 18, wherein the metal seed layer has a thickness less than about 200 Å.

20. The method of claim 19, further comprising depositing a gap-fill copper layer onto the metal seed layer and wherein, depositing the gap-fill layer comprises,

placing the substrate surface into a copper solution, wherein the copper solution includes free-copper ions;

applying a second electrical bias to the substrate surface; and

reducing the free-copper ions with the second electrical bias to deposit the copper gap-fill layer onto the metal seed layer.

21. The method of claim 20, wherein depositing the bulk-fill copper layer onto the copper gap-fill layer comprises,

placing the substrate surface into a second copper solution, wherein second copper solution includes the free-copper ions;

applying a third electrical bias across the substrate surface; and

reducing the free-copper ions with the third electrical bias deposit the copper bulk-fill layer onto the copper gap-fill layer.

22. The method of claim 21, wherein at least one leveling agent is added to the copper solution to form the second copper solution.

23. A method for electroplating a copper seed layer to a barrier layer from a copper solution, comprising:

placing a substrate surface comprising the barrier layer into fluid contact with the copper solution, wherein the copper solution comprises copper ions and complexing compounds; and

reducing the copper ions with an electrical bias to form the copper seed layer.

24. The method of claim 23, wherein the barrier layer is selected from the group consisting cobalt, ruthenium, nickel, tungsten, tungsten nitride, titanium, titanium nitride and silver.

25. The method of claim 23, wherein the copper solution comprises at least one copper source compound selected from the group consisting copper citrate, copper borate, copper tartrate, copper oxalate, copper pyrophosphate, copper acetate, copper EDTA complex and combinations thereof.

26. The method of claim 24, wherein the electrical bias is configured to generate a current density less than about 10 mA/cm^2 across the substrate surface.

27. The method of claim 26, wherein the current density is in a range from about 0.5 mA/cm^2 to about 3 mA/cm^2.

28. The method of claim 14, wherein the copper ions have a metal concentration in a range from about 0.02 M to about 0.8 M.

29. The method of claim 15, wherein the complexing compounds have a concentration in a range from about 0.02 M to about 1.6 M.

30. The method of claim 27, wherein the copper seed layer has a thickness less than about 200 Å.

31. The method of claim 30, further comprising depositing a gap-fill copper layer onto the copper seed layer and wherein, depositing the gap-fill layer comprises,

placing the substrate surface into a second copper solution, wherein the second copper solution includes free-copper ions;

applying a second bias across the substrate surface; and

reducing the free-copper ions with the second bias to deposit the copper gap-fill layer onto the copper seed layer.

32. The method of claim 31, wherein depositing a bulk-fill copper layer onto the copper gap-fill layer comprises,

placing the substrate surface into a third copper solution, wherein third copper solution includes the free-copper ions;

applying a third bias across the substrate surface; and

reducing the free-copper ions with the third bias deposit the copper bulk-fill layer onto the copper gap-fill layer.

33. The method of claim 32, wherein at least one leveling agent is added to the second copper solution to form the third copper solution.